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REMARKS

Claims 1-14 are pending in the application. Favorable reconsideration of the application, as amended, is respectfully requested.

I. TELEPHONE INTERVIEW

Applicant would like to thank the Examiner for taking the time to conduct a telephone interview with the applicant's undersigned representative on January 8, 2004. During the interview, the teachings of *Yamaguchi et al.* in view of *Toyoda et al.* were discussed in view of the features recited in claim 1.

Applicant's representative pointed out how *Toyoda et al.* does not teach a shim coil let alone a superconducting shim coil. As is discussed in more detail below, Applicant's representative stressed how the references did not teach or suggest a main coil assembly, a B0 shim coil assembly and control means which provide ***significant compensation*** (resulting in a sustained improvement in performance) ***for the effect of variation of the magnetic field*** within the working volume ***with time whilst the current flow in*** the main coil assembly ***and*** the B0 shim coil assembly ***remains superconducting***.

Although an agreement was not reached at such time, the Examiner expressed appreciation of the distinctions between the present invention as recited in claim 1 and the teachings of *Yamaguchi et al.* in view of *Toyoda et al.* The Examiner recommended that the applicant file this response emphasizing the points discussed during the interview. The Examiner offered to telephone the undersigned if he felt any further changes were needed in the claims.

II. REJECTION OF CLAIMS 1-14 UNDER 35 USC §103(a)

Claims 1-14 stand finally rejected under 35 USC §103(a) based on *Yamaguchi et al.* in view of *Toyoda et al.* Withdrawal of the rejection is respectfully requested for at least the following reasons.

In maintaining th rejection, the Examiner submitted in the Office Action that both *Yamaguchi et al.* and *Toyoda et al.* describe systems which use magnets and

shims. The Examiner argued that a skilled artisan desiring to achieve the beneficial results of a superconductive magnet would have been motivated to use superconducting magnets as taught by *Toyoda et al.* in *Yamaguchi et al.* to improve imaging quality. (See, O.A., p. 4).

As pointed out in the above-referenced telephone interview, claim 1 recites that the *compensation for variation* of the magnetic field within the working volume *with time* is applied *whilst* the current flow in the main coil assembly and the B0 shim coil assembly *remains superconducting*. The fact that the invention relies on compensation for variation in the magnetic field whilst the current in the main coil *and* the B0 shim coil remains superconducting is particularly significant. It means that the compensation method does not require current injection so that the method is essentially passive.

This contrasts with the compensation method of *Toyoda et al.* which is active insofar as it involves current injection with part of the circuitry becomes *normally* conducting to effect such compensation. More specifically, *Toyoda et al.* uses current injection which involves changing from superconducting current flow to *normal* current flow.

By contrast, the compensation method of claim 1 does not utilize non-superconducting (normal) current flow and does not involve current injection, so that it enables a level of stability to be obtained in compensating for variation of the magnetic field within the working volume *with time* such that the necessary experiments can be performed with accuracy even under relatively inhospitable conditions.

The Examiner previously argued in the Office Action that the sole difference between claim 1 and *Yamaguchi et al.* is that the latter uses a non-superconducting magnet system, rather than a superconducting magnet system. However, applicant respectfully submits that this is a gross oversimplification. Not only are different control systems involved as discussed above, namely active control involving current injection in the case of *Yamaguchi et al.* and passive control without current injection in the present invention, but also *Yamaguchi et al.* does not teach or suggest compensation for the effect of variation of the magnetic field within the working volume *with time*, as recited in claim 1.

Rather, as pointed out in the above-noted telephone interview, *Yamaguchi et al.* is concerned with providing a predetermined magnetic field compensation *in accordance with values stored in a computer. Yamaguchi et al.* does not provide for *compensation* of unpredictable variations in the ambient magnetic fields *with time* as recited in claim 1.

The Office Action cites *Toyoda et al.* solely on the ground that the reference discloses a superconducting coil arrangement. As pointed out in the aforementioned telephone interview, however, there is no mention at all in *Toyoda et al.* of shim coils, that is coils for providing fine adjustment of the central magnetic field, let alone superconducting shim coils.[1]

As discussed in the telephone interview, the fact that the currents in the main coil assembly and the B0 shim coil assembly remain superconducting as recited in claim 1 enables control of the magnetic field in real time to compensate for time varying field perturbations. Such time varying control is enabled by the fact that control of the main coil and shim coil superconducting currents in this manner enables accurate tracking of the generally small field variations (which may of the order of a few billionths per hour), whereas the inherent instability of the current variation in an arrangement in which the currents do not remain superconducting (e.g., as in the applied references) means that it simply would not be possible to track the field variations with sufficient accuracy. It is believed that there are not even any power supplies available for such an application which could provide this level of accuracy in systems such as *Yamaguchi et al.* and *Toyoda et al.*

Simply stated, *Yamaguchi et al.* and *Toyoda et al.*, whether taken individually or in combination, do not teach or suggest a system having a main coil assembly, a B0 shim coil assembly and control means which provide ***significant compensation***

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[1]Applicant again notes that the International Examiner incorrectly identified the component 5 in Figure 1 in *Toyoda et al.* as a shim coil. In fact, component 5 is a heater (see, e.g., Col. 1, lns. 40-51) to heat the superconductive lead to a temperature above the critical temp rature (the temperatur at which the lead becomes non-superconducting).

(resulting in a sustained improvement in performance) ***for the effect of variation of the magnetic field*** within the working volume ***with time whilst the current flow in*** the main coil assembly ***and*** the B0 shim coil assembly ***remains superconducting.***

Thus, withdrawal of the rejection of claim 1 and claims 2-14 dependent therefrom is respectfully requested.

III. CONCLUSION

Accordingly, claims 1-14 are believed to be allowable and the application is believed to be in condition for allowance. A prompt action to such end is earnestly solicited.

Should the Examiner feel that a telephone interview would be helpful to facilitate favorable prosecution of the above-identified application, the Examiner is invited to contact the undersigned at the telephone number provided below.

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Should a petition for an extension of time be necessary for the timely reply to the outstanding Office Action (or if such a petition has been made and an additional extension is necessary), petition is hereby made and the Commissioner is authorized to charge any fees (including additional claim fees) to Deposit Account No. 18-0988.

Respectfully submitted,

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